7.06

STANDARD OPERATING PROCEDURES FOR THE COLLECTION OF SAMPLES FOR PHYTOPLANKTON AND CHLOROPHYLL ANALYSIS IN LAKES

Summary

Phytoplankton and chlorophyll-a samples are two of the most important biological parameters measured in a lake. Chlorophyll is important because of its close relationship to phytoplankton biomass and it is a key indicator of trophic status. Phytoplankton community assemblages can be excellent indicators of water quality.

In general, a six-foot depth integrated sample is collected over the deepest area of the lake. A known volume of sample is filtered through a membrane for chlorophyll analysis. A second known volume of the sample is preserved for phytoplankton identification and enumeration.

Equipment and Supplies

- ☐ Six-foot tube style water collector with a two-inch inside diameter
- ☐ Two-gallon plastic bucket
- ☐ Sample containers
  - o One 40-ml glass amber vile for each phytoplankton sample
  - o One 50-ml plastic vial for each chlorophyll filtration
- ☐ Aluminum foil
- ☐ 0.65 µm glass fiber filters (Pall Corp. Glass Fiber Filters No. 61631, 0.47mm or equivalent)
- ☐ Filter apparatus with vacuum pump
- ☐ 500 ml graduated cylinder
- ☐ Stainless steel forceps
- ☐ Deionized water for decontamination
- ☐ M3 solution
- ☐ Sample ID/Custody Report forms
- ☐ Field report forms
- ☐ Sample log forms
- ☐ Sample labels
- ☐ Pen
- ☐ Cooler(s) with ice or frozen gel packs.

Phytoplankton sample collection

1. Rinse the tube collector, bucket, and sample containers with deionized water.

2. Collect a depth integrated water column sample by immersing the collecting tube to a depth of six feet. Cap the end of the tube and invert the tube.

3. Pour the contents of the tube into the two-gallon bucket. Note: If the sample was collected properly, the sample volume should be approximately 1 gallon.

4. Completely mix the sample and decant a 40 ml aliquot of the sample off into one glass amber vile for phytoplankton analysis.

5. Preserve the phytoplankton sample immediately with approximately 1 mL M3 solution to a final concentration of 1 percent.

6. Place a label on the sample container (Figure 7.06.03).

7. Place the sample in the cooler containing ice or frozen gel packs.

8. Fill out the field reporting form (Figure 7.06.01) and the sample custody form (Figure 7.06.2). If the sample log indicates the collection of a duplicate sample, follow the steps below for the collection of a chlorophyll sample, then collect the duplicate sample following the above procedures. Note: Field duplicate samples should be identified with STORET number 389999. Be sure to indicate on the label the waterbody name and site number of the sample being duplicated.

Chlorophyll Sample Collection and Filtration

1. Completely mix the remaining sample and collect two liters of sample in a cubitainer and place the sample in a cooler on ice immediately.

2. Filter the sample immediately.

3. Remove the filter apparatus from the plastic bag and assemble.

4. Rinse the filter apparatus three times with approximately 250 ml of deionized water each time.

5. Load a glass fiber filter in the apparatus and connect the vacuum pump.

6. Using the graduated cylinder, measure out and filter a known amount of sample.
Note: Filter enough sample so that the filter is distinctly coated with algae, a minimum of 500 ml should be filtered.

7. Remove the filter from the filter assembly, fold once, and place in a 50 mL vial.

8. Place a label on the vial (Figure 7.06.03).
Note: On the label, include the volume of sample run through the filter.

9. Wrap the vial in aluminum foil to exclude light.

10. Place the sample in the cooler on ice.

11. Fill out the field reporting form (Figure 7.06.01) and the sample custody form (Figure 7.06.2). If the sample log indicates the collection of a duplicate sample, repeat the above procedures for the collection and filtration of a chlorophyll sample. Note: Field duplicate samples should be identified with STORET number 389999. Be sure to indicate on the label the waterbody name, site number and volume filtered for the sample being duplicated.

North Dakota Department of Health
Division of Water Quality
Lake and Wetland Profile Field Log
Telephone: 701.328.5210
Fax: 701.328.5200

Project Code:		**Project Name:**	
Site Identification:		**Site Description:**	
Date: / /	**Time: :**	**Ambient Temp:**	**Wind Speed:**
Wind Direction:	**%Cloud Cover:**	**Secchi Disk: (m)**	**Baro: (mm/Hg)**
Chlorophyll-a:	**Phytoplankton:**	**Initial DO:**	**Final DO:**
Sample Depths:_____ Meters _____		**Meters _____ Meters _____**	
Sampler(s):			
Comments:			

Depth (m)	Temp (c)	DO (Mg/L)	pH	Specific Conduct.	Comments

Figure 7.06.01 Water Quality Field Log

North Dakota Department of Health
Sample Identification Record
Division of Laboratory Services–Chemistry
Telephone: 701.328.6140
Fax: 701.328.6280

For Laboratory Use Only Lab ID:	
Preservation: Yes □	Temperature:
Initials:	

Surface Water Sample Identification Code R (Water samples)
Samples received without this sheet or without all necessary sections fully completed will be rejected and not analyzed.

Sample Collection/Billing Information

Account #	**Project Code:**	**Project Description:**	
Customer (Name, Address, Phone): SWQMP, Division of Water Quality, Gold Seal Center, 4th Floor			
Date Collected:	**Time Collected:**	**Matrix:** Water	**Site ID:**
Site Description:			
Alternate ID:	**Collected By:**		
County Number:	**County Name:**		
Comment:			
Comment:			

Field Information/Measurements

Sample Collection Method (Circle One): Grab DI* DWI** 0-2 meter column	**Depth:**	**Units:**	**Discharge:**	**Stage:**
Conductivity:	**pH:**	**Temp:**	**Dissolved O_2**	**Turbidity:**
Comment:				

Analysis Requested

□ 5) SW-Major Cations/Anions	□ 74) SW-PAHs	□ 33120) SW-E. coli	
□ 7) SW-Trace Metals	□ 84) SW-PCBs	□ SW-TOC	
□ 21) SW-Carbamates	□ 105) SW-Chlorophyll-a & b Volume Filtered:_____mL	□ SW-DOC	
□ 23) SW-Acid Herbicides	□ 118) SW-TSS	□ SW-C-BOD-5day	
□ 25) SW-Base/Neut. Pest	□ 144) SW-Trace Metals-dissolved	Other:	
□ 30) SW-Nutrients, Complete	□ 160) SW-Nutrients, Complete-dis		
□ 50) SW-Nutrients, Total P-dis.	□ 33080) SW-Fecal coliform bacteria		

Figure 7.06.2 Sample Identification/Custody form. * Depth Integrated ** Depth/Width Integrated

Project Code **Project Description**

Sample ID **Station Description**

Analysis: 105) Chlorophyll-a&b Volume Filtered _____
Container: 50 mL vial **Preservation: Cool to 4 Degrees C**
Date:_____ /_____ /_____ Time:____:_____ Depth:_____
Sampler:

Project Code **Project Description**

389990 **Station Description**

Analysis: 105) Chlorophyll-a&b Volume Filtered _____
Container: 50 mL vial **Preservation: Cool to 4 Degrees C**
Date:_____ /_____ /_____ Time:____:_____ Depth:_____
Sampler:

Project Code **Project Description**

389999 **Station Description**

Analysis: 105) Chlorophyll-a&b Volume Filtered _____
Container: 50 mL vial **Preservation: Cool to 4 Degrees C**
Date:_____ /_____ /_____ Time:____:_____ Depth:_____
Sampler:

Figure 7.06.03. Chlorophyll-a&b Label, Chlorophyll-a&b Blank Label, and Chlorophyll-a&b Duplicate Label.

Project Code **Project Description**

Sample ID **Station Description**

Analysis: Phytoplankton
Container: 40 mL vial **Preservation: 2.0 Ml M3 / Cool**
Date:_____ /_____ /_____ Time:____:_____ Depth:_____
Sampler:

Project Code **Project Description**

389990 **Station Description**

Analysis: Phytoplankton
Container: 40 mL vial **Preservation: 2.0 Ml M3 / Cool**
Date:_____ /_____ /_____ Time:____:_____ Depth:_____
Sampler:

Project Code **Project Description**

389999 **Station Description**

Analysis: Phytoplankton
Container: 40 mL vial **Preservation: 2.0 Ml M3 / Cool**
Date:_____ /_____ /_____ Time:____:_____ Depth:_____
Sampler:

Figure 7.06.04. SWQMP Phytoplankton Label, Phytoplankton Blank Label, and Phytoplankton Duplicate Label.